SUCCESSFUL AGING

Optimal Medication Use in Elders
Key to Successful Aging

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Pharmacotherapy represents one of the most important ways in which the practice of geriatric medicine differs from conventional medical care. The older patient is a major consumer of prescription and nonprescription medications, and proper use of these agents can lead to more cost-effective strategies in reaching optimal health. A key difference in distinguishing appropriate from inappropriate drug use is evident in the themes of polymedicine and polypharmacy. Polymedicine describes the use of medications for an older population for the treatment of multiple co-morbid conditions, while polypharmacy represents a less-than-desirable state with duplicative medications, drug-to-drug interactions, and inadequate attention to pharmacokinetic and pharmacodynamic principles. The purpose of this paper is to outline strategies toward optimal medication use as a key to successful aging. Specifically, we discuss themes of cost-effective prescribing, the role of medication compliance, overuse and underuse of medication, over-the-counter products, alcohol abuse, and preventive medicine. In addition, we discuss policy implications and responsibility for ensuring the high quality of pharmaceutical care. The reader should have a practical understanding of the pertinent issues in geriatric clinical pharmacology and its relationship to successful aging.

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The beginning and end of each day for practitioners often feature prescribing a medication. Regardless of the various pathophysiologic mechanisms and the setting of care, the most common therapeutic intervention in medicine is the writing of a prescription.[1] This practice takes on even greater meaning in geriatric patients. Older people take about three times as many prescription medications as younger patients do, mainly because of the increased prevalence of chronic medical conditions. For this reason, multiple medications (polymedicine) may be beneficial in treating multiple illnesses.[2]

Ongoing advances in biomedical research have led to new and better prescription drugs, and today 24 million Americans aged 65 years or older receive prescriptions each year.[3] One study showed that elderly women took an average of 5.7 prescription drugs and 3.2 over-the-counter drugs concurrently.[4] These figures are noteworthy because the use of multiple medications increases the risk of adverse drug events and makes medication compliance more challenging.[5]

Pharmacotherapy as Cost-effective

Pharmacotherapy represents one of the most important ways in which the practice of geriatric medicine differs importantly from conventional medical care. Changes in both the pharmacokinetics and pharmacodynamics of drugs commonly used in the geriatric population have been described, and a discussion of them is beyond the scope of this article. Yet, the proper use of medications is perhaps the single most important medical strategy in the care of elderly patients. Optimal drug therapy is key to treating acute illness, maintaining current health, and preventing further decline, all three of which represent the paradigm of geriatric care and are prominent in the themes of successful aging.[6]

Medication Compliance

Definition of Compliance

Compliance can be defined as the extent to which a person's use of medications coincides with medical or

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health advice. Other investigators have chosen similar terms to describe this behavior, including adherence, fidelity, and maintenance, because compliance has been associated with negative connotations of servility or obedience.

Prevalence of Noncompliance

Various procedures have been used to evaluate compliance. Indirect methods include patient interview, physician estimate, pill count, and refill record. The first two approaches, patient interview and physician estimate, can detect 50% of cases of noncompliance quickly and inexpensively. In addition, these techniques offer the opportunity to provide immediate feedback, which also serves to show concern for a patient's well-being. The disadvantage of these techniques, however, is their dependence on a patient's memory and honesty and the skills of the interviewer. The pill count method, in which the number of tablets in a medication bottle is measured at two points over a given time interval, provides a more objective measure of the quantity taken. Nonetheless, this method is time-consuming and also assumes that all medications not in the container were actually consumed. The refill-record method uses a standardized measure from pharmacy data or large fiscal databases of filled prescriptions to examine the continuity of medication use and gaps in therapy, but this method requires that all prescriptions be reimbursed through the same administrative source. More direct methods of assessing compliance include blood level monitoring and urine assays to measure drug metabolites or marker compounds. Although both these direct measures provide objective data that are valid and quantitative, their use is limited by their expense, inconvenience, and unavailability for some drugs.[7]

Although compliance with short-term medication use has been reported to approximate 80%, the same cannot be said for long-term medication use: several studies of elderly persons with common and serious clinical disorders such as congestive heart failure, diabetes mellitus, and tuberculosis have found compliance rates between 40% and 60% for long-term therapy.[8] Another classification of compliance represents medication use patterns along a continuum. Half to two thirds of patients use medication satisfactorily (≥80% of prescribed doses). Another third of patients are partially compliant, taking 40% to 80% of prescribed doses; the rest take their drugs erratically, possibly undercutting even the best-conceived regimens.

Poor compliance with prescribed medications can have major clinical consequences, especially in older persons. If the existence of noncompliance is not recognized, the physician may increase the dose of the initial medication or add a second agent, increasing both the risk and the cost of treatment.

Strategies to Improve Compliance

What strategies can be used to improve compliance? Approaches that have been shown to be effective in the past include educating patients, promoting compliance, and simplifying the medication regimen. Successful compliance, however, depends on the actions by not only the physician and patient but also the support system (for example, caregiver) of the patient. Given the rapid increase in diagnosis and therapeutic options, obtaining the utmost benefit of medication use will play a major role in the coming decade in improving the quality of patient outcomes.

Polypharmacy

Definition

Polypharmacy or polymedicine has many definitions. Healthy People 2000 defined polypharmacy as the concurrent use of multiple prescription drugs and over-the-counter medications and considered it the principal drug safety problem in the United States.[9(p67)] Other definitions have included a measure of appropriateness such as the prescription, administration, or use of more medications than are clinically indicated, or when a medical regimen includes at least one unnecessary medicine. The use of one medication to treat the adverse effects of another medication represents polypharmacy as well; there are exceptions to this rule, however, such as potassium supplementation for diuretic therapy. On the other hand, a case of osteoarthritis in an elderly woman who is being treated with acetaminophen with codeine in which the patient requires three laxatives to relieve the codeine-induced constipation is an example of an adverse consequence of polypharmacy. Finally, some researchers have quantified the definition: the concomitant use of five or more medications, for instance. This definition is useful as a quick screen to identify patients whose medications may need to be reviewed—that is, there is a high probability of inappropriate prescribing. When using a definition that includes some measure of appropriateness, remember that it takes only one medication to cause a problem.

Frequency of Polypharmacy

In one study, explicit criteria were developed to measure the frequency with which elderly nursing home residents were exposed to medication use considered inappropriate, for an inappropriate duration, or in a dose exceeding criteria limits.[10] Of the residents, 40% had at least one inappropriate medication order and 10% two or more orders. In another study, these same criteria were applied to respondents aged 65 and older to the 1987 National Medical Expenditure Survey as a means of measuring inappropriate prescribing for community-dwelling elderly persons.[11] Based on this sample, the investigators concluded that 6 million older Americans (almost 25% of the population) were exposed to possibly inappropriate medication use.

Origins

Polypharmacy has many origins. The use of several prescribers or several pharmacies has been shown to

increase the risk for medication-related problems. These two origins are both somewhat within a patient's or informal caregiver's control. For example, many patients will assume that all their prescribers communicate with each other and therefore are aware of what each is prescribing or recommending. Patients may also incorrectly assume that the computer databases of different pharmacies are linked and will identify potential drug-drug interactions. As a means of prevention, patients should provide each prescriber and pharmacist with a list of all their medications: prescription, over-the-counter, and alternative therapies. Patients should also be encouraged to use only one pharmacy or one chain whose database is linked or to join a prescription drug plan that links a network of participating pharmacies. Physicians and pharmacists should also provide patients with a regular, comprehensive medication review to eliminate unnecessary medications, identify possible medication-related problems, and answer patients' questions about their medication regimen.

Polypharmacy also has an origin in patients' belief that they need a pill for every ill. It is incumbent that prescribers not use writing an unnecessary prescription as a means of ending an office visit or satisfying a patient's demands. The lack of a health-educated patient population may be another cause of polypharmacy. A patient's lack of knowledge of what is caused by normal aging versus disease may lead to unnecessary medication use. For example, insomnia in an older adult may be due to the normal sleep changes of aging. Explaining these changes and reviewing sleep hygiene may be sufficient treatment. Before patients can receive appropriate education, physicians, pharmacists, nurses, and other health professionals must have the necessary knowledge and understanding of these principles.

Consequences of Polypharmacy

The consequences of polypharmacy are multiple and include adverse drug events, drug-drug interactions, the duplication of therapy, decreased quality of life, and unnecessary financial costs. The use of multiple drugs is a risk factor for adverse drug events. Between 10% and 17% of hospital admissions for older patients are related to an adverse drug reaction.[12] Another study attributed 73% of adverse drug reactions to unnecessary drugs, possible drug interactions, or contraindicated medications.[13]

The risk of drug-drug interactions increases with the number of medications taken. Data from the Swedish National Formulary identified at least one possible drug interaction in 31% of mostly older outpatients. Patients with at least one drug interaction used substantially more medications than those without (mean, 8.1 versus 5.2.).[14] The use of several physician-prescribers was the single most important factor associated with possible drug-drug interactions among persons aged 70 years and older in Quebec.[15] The use of a single pharmacy reduced the risk of a possible drug-drug interaction by 21% to 32% for all drugs.[15]

Patients' quality of life can also be adversely affected by polypharmacy. Prescription drug use was associated with a decreased ability to perform activities of daily living and an increase in symptoms in 60% of women aged 65 years and older in Baltimore, Maryland.[16] Another study found that the risk of an adverse drug reaction manifesting as cognitive impairment was increased more than ninefold for those taking four or more medications.[17] In a study that assessed the relationship between medication and incontinence in 128 patients enrolled in a study of incontinence, 62% of patients were receiving one or more medications that had possible urologic effects.[18]

Undermedication or Omission

The frequency and consequences of undermedication or omission have not been as extensively studied as multiple medication use. The limited data available suggest that a substantial number of older persons who might benefit from drug therapy are not taking the appropriate medications. Among participants in the Established Populations for the Epidemiologic Studies of the Elderly (EPESE), between 10% and 29% who reported their health as fair or poor also reported that they were taking no prescription medications.[19]

In one study, 49% of patients at discharge and in outpatient follow-up had one or more dosage problems as judged by a seven-member physician-pharmacist panel.[20] Inadequate dosage was identified in 21% of patients, with calcium supplements, transdermal nitroglycerin, and bronchodilators the most frequently underdosed medications. In addition, 55% of patients had one or more necessary medications omitted from their profile. Iron supplements for postoperative patients, cholesterol-lowering agents, oral hypoglycemic agents, and bronchodilators were the most frequent omissions.

Over-the-Counter Medications

Simply defined, over-the-counter medications are those medications that are obtained without a prescription. The fact that patients and physicians alike often think that these nonprescription drugs have little pharmacologic activity and are relatively safe and easy to use is troublesome for optimal medication use. Although nonprescription medications represent an important part of the therapeutic package available to patients and physicians, physicians should be aware of their patients' use of these drugs under all circumstances and also of the benefits and risks of these medications.

The history of nonprescription drugs in the United States can be traced back to the 1850s, when most health care was provided not by physicians but by lay practitioners. Two powerful trends, patient empowerment and the reclassification of many prescription medications to over-the-counter status, are important influences that have led to increased over-the-counter drug use. A sur-

vey has confirmed that the use of nonprescription drugs was not due to substituting for prescription medications or for obtaining professional medical care for illnesses perceived as serious by the patient.[21] Patients with higher education levels, elderly patients, those with less time available for physician visits, and those with less access to professional medical care are more likely to use nonprescription medications, as are patients who are socially isolated or who have chronic illnesses. Interestingly, the use of nonprescription and prescription drugs is correlated particularly because less healthy persons use more of both types of these drugs.[21]

Alcohol and Medications

The consumption of alcoholic beverages by older persons is not uncommon, yet consumption in combination with medications is potentially dangerous. Interactions between alcohol and many medications frequently taken by the elderly are well described. For example, alcohol consumption in combination with other medications known to cause drowsiness can potentiate the sedation and impair physical and cognitive function, and its use with nonsteroidal anti-inflammatory agents can increase the risk for gastrointestinal bleeding. Alcohol can potentiate the blood pressure–lowering effects of antihypertensive and diuretic agents; increase the hepatic metabolism of warfarin sodium and phenytoin, thereby minimizing their therapeutic activity; and reduce the absorption of vitamins. In addition, alcohol use may worsen symptoms or accelerate the progression of chronic disease states common in elderly persons, such as depression, congestive heart failure, and diabetes mellitus. A periodic review of medication use should include screening questions on alcohol use as well.

Preventive Medicines

Medications play a large role in preventing disease in older adults. The benefits of aspirin use in the prevention of myocardial infarction and stroke are well documented. It is clear that the control of systolic and diastolic blood pressures reduces both the morbidity due to stroke, coronary heart disease, and congestive heart failure and all-cause mortality. The treatment of hyperlipidemia in older patients remains controversial; yet, population-based surveys of persons aged 65 and older indicated that less than 0.5% of respondents were receiving lipid-lowering medication.[22,23] Postmenopausal estrogen replacement decreases the risk for osteoporosis and heart disease and may have a role in preventing memory loss or Alzheimer's disease. Estrogen therapy has not been widely prescribed for nor accepted by older women, however.[24] The use of β-blockers after acute myocardial infarction has been reported to be less than 25%.[25] Warfarin is the recommended anticoagulation agent for atrial fibrillation, but it is not widely used because of the fear of bleeding complications.[26] Much work is needed to increase the role of prevention in elderly patients and should be directed to physicians and patients alike.

Policy Implications

Public Versus Private

Many vehicles are currently available for improving medication use. Several strategies focus on computer-assisted reminders to alert either a prescriber or pharmacist of the dangers associated with either a single medication or multiple drug-drug interactions in patients. Yet, these systems are limited by the accurate reporting of the medication use and the completeness of the data on medication use patterns. A surveillance system to track medication use across several pharmacies is needed: such a system exists for a variety of fiscal-claims databases, and this is one advantage of the prescription drug plans offered by pharmaceutical benefit managers. Further integration of the health care system will lead to more coordinated care and improve prescribing in this vulnerable population.

Who Is Responsible?

The responsibility for ensuring high-quality care around pharmaceutical use remains a challenge. Prescribers like to think that they are prescribing in the best interests of their patients, yet they are left with incomplete information in making this link. Because there is no "diagnosis-related group" or International Classification of Diseases codes for medication use, large population studies become difficult. The perverse fiscal system in which Medicare pays for therapeutic failure (noncompliance) or adverse drug effects (polypharmacy), but does little to either pay for or supervise drug use in the ambulatory care environment furthers uncoordinated care. The new wave of capitated agreements in which physicians are at risk for both the cost of the prescription therapy and that associated with adverse drug events has the potential to improve drug use overall.

Summary Points

- The use of any medication puts a person at risk for an adverse drug event. Because of changes in pharmacokinetics and pharmacodynamics and the prevalence of chronic disease, this is especially true in elderly persons.
- The omission or underdosage of a medication(s) may result in an incomplete therapeutic response or progression of a disease state. Physicians should balance both benefit and risk to optimize their prescribing practice.
- The balance of too few, too little, too many, and too much is delicate with respect to medication use by older patients, and thus, any medication regimen must be tailored to an individual patient's needs.

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